

REMARKS

Applicants appreciate the thorough examination of the present application that is reflected in the Official Action of July 13, 2004 and the indication that Claims 13-15 and 31-33 are directed to allowable subject matter. Applicants have rewritten Claims 13-15 and 31-33 into independent form. Applicants have also amended independent Claims 1, 10, 20 and 28 to include the recitations of dependent Claims 2, 11, 21, and 29, respectively. As discussed below, the cited art clearly does not teach or suggest the recitations of these dependent claims and, as such, Applicants respectfully submit that this application is now in condition for allowance, which is respectfully requested.

I. The Independent Claims, as Amended, are Patentable Over Gailus

In the Official Action, independent Claims 1, 10, 20 and 28 stand rejected under 35 U.S.C. § 103(a) as obvious in view of U.S. Patent No. 6,449,465 to Gailus et al. ("Gailus"). Each of these claims have been amended to include a recitation regarding the location of the modulator that is included in the phase locked loop. By way of example, Claim 1 includes the following recitation, where the underlined material indicates recitations that have been added to Claim 1 from Claim 2:

a phase locked loop that includes a controlled oscillator having a controlled oscillator input, a controlled oscillator output and a feedback loop between the controlled oscillator input and the controlled oscillator output, the phase locked loop including therein a modulator that modulates the in-phase and quadrature-phase signals and the feedback loop including a mixer that is responsive to a local oscillator, wherein the modulator is in the feedback loop between the controlled oscillator output and the mixer, between the local oscillator and the mixer, or between the mixer and the controlled oscillator input; and

In rejecting Claim 2, the Official Action cites to Figure 7 of Gailus as disclosing the underlined portions of the above-quoted claim recitation. (See Official Action at 4). In particular, the Official Action states that Figure 7 (combined with Figure 4) discloses a mixer 740, an I/Q modulator 706, a local oscillator 742, a feedback loop 416, a controlled oscillator input 422 and a controlled oscillator output 411 that correspond to the mixer, modulator, local oscillator, feedback loop, controlled oscillator input and controlled oscillator output of the above-quoted claim recitation. However, even assuming, for purposes of argument, that Figures 4 and 7 disclose each of the above-recited elements, it

still clearly does not disclose or suggest the recitation of amended Claim 1 regarding the location of the modulator in the feedback loop.

In particular, amended Claim 1 recites that "the modulator is in the feedback loop [1] between the controlled oscillator output and the mixer, [2] between the local oscillator and the mixer, or [3] between the mixer and the controlled oscillator input." However, in the system of Gailus the modulator is not in any of the three specified locations. Specifically, in Figures 4 and 7 of Gailus, the controlled oscillator output is signal 411 and the mixer is mixer 740. The elements disposed between the controlled oscillator output 411 and the mixer 740 comprise power amplifier 410, impedance modulator 412 and signal coupler 414. The I/Q modulator 706 thus is not in the first [1] of the three locations recited in amended Claim 1.

In the system of Gailus, the local oscillator 742 and the mixer 740 are directly coupled to each other, and there are no intervening elements. Thus, the I/Q modulator 706 also is not in the second [2] of the three locations recited in amended Claim 1. Finally, in the system of Gailus, the elements disposed between the mixer 740 and the controlled oscillator input 422 comprise comparator 702, amplifier 736, splitter 718, mixer 716 and amplifier 708. While the output of the I/Q modulator 706 is coupled to the comparator 706, the I/Q modulator 706 itself is clearly not between the mixer 740 and the controlled oscillator input 422. Thus, the I/Q modulator 706 also is not in the last [3] of the three locations recited in amended Claim 1.

For the above reasons, Applicants respectfully submit that Gailus does not disclose or suggest all of the recitations of amended Claim 1. Moreover, as amended Claims 10, 20 and 28 each include similar recitations regarding the location of the modulator (or the location of where the modulation is performed) that are not taught by Gailus, Applicants respectfully submit that Gailus likewise does not disclose or suggest the inventions of Claims 10, 20 and 28 either. Accordingly, Applicants respectfully submit that the rejections of Claims 1, 10, 20 and 28 should be withdrawn.

II. The Dependent Claims are Also Patentable

Applicants have rewritten dependent claims 13-15 and 31-33 into independent form. As the Official Action found that these claims were directed to allowable subject matter, each of these claims are now in condition for allowance.

Applicants also submit that each of the remaining dependent claims is patentable for the reasons discussed above that each of the independent claims are patentable. In addition, Applicants submit that at least dependent Claims 3-5, 16, 22-24 and 34 are independently patentable for the following reasons.

Claims 3 and 22 are directed to systems and methods in which the in-phase and quadrature-phase signals are normalized "such that the modulated signal is a constant amplitude modulated signal." The Official Action states that Gailus discloses this at Column 5, line 52 through Column 6, line 11, because Gailus discloses that the digital signal processor 401 also converts the information signal into a polar format. (Official Action at 4). However, the "in-phase" and "quadrature-phase" signals of Claims 3 and 22 that are **normalized are the in-phase and quadrature-phase signals that are modulated by the modulator in the phase locked loop**. (See Claims 1 and 20). The amplitude component 406 generated by the digital signal processor 401 of Gailus, however, is **not** modulated within the phase locked loop, but instead is sent to switching power supply 426. As such, Gailus clearly does not disclose or suggest using normalized in-phase and quadrature-phase signals that are modulated within a phase lock loop as recited in Claims 3 and 22. Thus, the rejections of Claims 3 and 22, as well as Claims 4-5 and 23-24 which depend therefrom, should also be withdrawn for at least this additional reason.¹

Claim 16 recites that the "phase tracking system further comprises a limiter between the quadrature modulator and the phase locked loop." Claim 34 recites a similar method recitation. The Official Action states that limiter 520 in Figure 5 of Gailus comprises the limiter of Claim 16 and the limiting step of Claim 34. However, this position is inconsistent with other positions taken within the Official Action. In particular, in the rejection of Claims 1, 10, 20 and 28 the Official Action takes the position that the I/Q modulator 506 of Gailus **is part of** the phase lock loop. (See, e.g., Official Action at page 3). Under this interpretation of Gailus, it is physically impossible for the limiter to

¹ Applicants also respectfully submit that the additional recitations included in Claims 4-5 and 23-24 are not disclosed or suggested by Gailus. However, in light of the multiple reasons discussed above that these claims are patentable over Gailus, discussion of these additional reasons should not be necessary.

be between the quadrature modulator and the phase locked loop. Thus, the rejection of Claims 16 and 34 should also be withdrawn for at least this additional reason.

III. New Claim 37 is Patentable Over the Cited Art

Applicants have added new Claim 37 to the application. Claim 37 recites as follows:

37. (New) A modulation system comprising:
- a digital signal processor that generates in-phase, quadrature-phase and amplitude signals from a baseband signal;
 - a phase locked loop that includes a controlled oscillator having a controlled oscillator output, the phase locked loop including therein a modulator that modulates the in-phase and quadrature-phase signals; and
 - an amplifier having a signal input, an amplitude control input and an output, wherein the signal input is responsive to the controlled oscillator output and the amplitude control input is responsive to the amplitude signal, and wherein the signal input includes the modulated in-phase and quadrature-phase signals from the phase locked loop.

Thus, Claim 37 is identical to original Claim 1, except that Claim 37 also recites that the signal input to the amplifier "includes the modulated in-phase and quadrature-phase signals from the phase locked loop." Support for Claim 37 is provided, for example, in original Claim 1 and the Title and FIG. 16 of the application.

Applicants respectfully submit that Gailus does not disclose or suggest the system of new Claim 37. In particular, Gailus clearly explains that the I/Q modulator 506 of Figure 5 and the I/Q modulator 706 of Figure 7 are used to generate control signals 420 and 422 that represent the amplitude and phase modulation errors, respectively. (See, e.g., Gailus at Col. 3, lines 51-56, Col. 4, lines 16-19, Col. 6, lines 55-58, Col. 7, lines 10-15, Col. 12, lines 34-57). In fact, Figures 5 and 7 of Gailus clearly show that the output of the I/Q modulators 506/706 is sent to a comparator 502/702 that subtracts the signal generated by the I/Q modulator 506/706 from a fed back signal 417 to produce the error signal. This error signal is then downconverted by the downconverter 510/710 and split into amplitude 420 and phase 422 error signals. Thus, in the system of Gailus, only a phase error signal 422 is fed to the power amplifier 410. Thus, Gailus clearly does not disclose or suggest feeding in-phase and quadrature-phases signals that were modulated in

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the phase lock loop to the amplifier as recited in new Claim 37. Thus, new Claim 37 is also patentable over Gailus.

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IV. Conclusion

Applicants submit that the present application is in condition for allowance and the same is earnestly solicited. Should the Examiner have any matters outstanding of resolution, he is encouraged to telephone the undersigned at 919-854-1400 for expeditious handling.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "D. Randal Ayers".

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on October 5, 2004.

A handwritten signature in black ink, appearing to read "Michele P. McMahan".

Michele P. McMahan
Date of Signature: October 5, 2004